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STUDIES IN SELECTION LEARNING IV:  
The Acquisition and Retention of Incidental Items in  
Selection Learning

Technical Report

No. 4

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## SUMMARY

Previous studies on selection learning have demonstrated superior retention of selection learners utilizing informative cues (IS) to those utilizing uninformative cues (US). These findings were accounted for by assuming that interference due to the learning of incidental items dissipates during the interpolated interval. The hypothesis was advanced that selection learners using informative cues will show higher incidental learning than selection learners using uninformative cues, but that they will also show a faster rate of forgetting of the incidental material. Experimental confirmation was obtained with respect to the differences in acquisition. Although the results pertaining to the retention of incidental items were in the predicted direction they failed to reach the acceptable level of significance.

## INTRODUCTION

In previous studies on selection learning (Technical Reports 1, 2, and 3) it was found that while selection learners are equal to rote learners in acquisition, their retention shows a marked superiority. These results were accounted for by assuming that the presence of incidental items creates both facilitation (due to active discrimination) and interference (due to the learning of incidental items). It was further assumed that interference dissipates at a faster rate than facilitation. Direct evidence for the effects of facilitation and interference on acquisition rates was obtained in previous experiments (Technical Report No. 3). It was also observed that interference dissipates at a faster rate for selection learners utilizing informative cues than those utilizing uninformative cues.

Another derivation of the hypothesis that the superiority of selection learners in retention is due to the dissipation of interference accumulated in acquisition can be advanced. When selection learners utilizing informative cues (IS) are compared for incidental learning with selection learners utilizing uninformative cues (US) more incidental learning should be observed for the former than for the latter. However, it also follows that IS learners should manifest a more rapid forgetting of the incidental items than US learners. The present experiment attempts to test this hypothesis.

### Method

Subjects. All 108 Ss were women in the introductory psychology courses at The University of Michigan. None of the Ss had participated

in previous psychological experimentation. Ss fulfilled a course requirement by participating in the present experiment.

Procedure. The Ss were randomly divided into 12 groups. Each group contained nine Ss. Six of the groups were run under IS conditions and six under US conditions. The learning material, method of presentation, and general procedure was identical to that described in Technical Report No. 1. In order to obtain a measure of incidental learning, there was one departure from this procedure. After different amounts of practice, each group was asked to record as many of the incidental items as they could recall. At the end of a particular presentation of the list, E turned off the tape recorder and gave Ss the following instructions: "Instead of writing the two odd and one even digit numbers you recall (the numbers preceded by three taps), I want you to try and write as many of the numbers which did not have two odd and one even digit (which were not preceded by three taps) as you can. Start right now and stop when I give you the signal." In this way incidental learning was measured at different points in acquisition and after 15 and 60 minutes of interpolated activity in the IS and US conditions. On the particular trial in which Ss were to recall the incidental items no recall was made of intentional items. All Ss were given 1 minute in which to recall. Under each experimental condition one of the six groups was asked to recall the incidental items at one of the following points in the experiment: After two trials, four trials, seven trials, ten trials, after 15 minutes of interpolated work, and after 60 minutes of interpolated work.

### Results

Figure 1 indicates that at all points during acquisition, informative cue selectors have learned more incidental items than uninformative cue selectors. Furthermore, under both the IS and the US condition

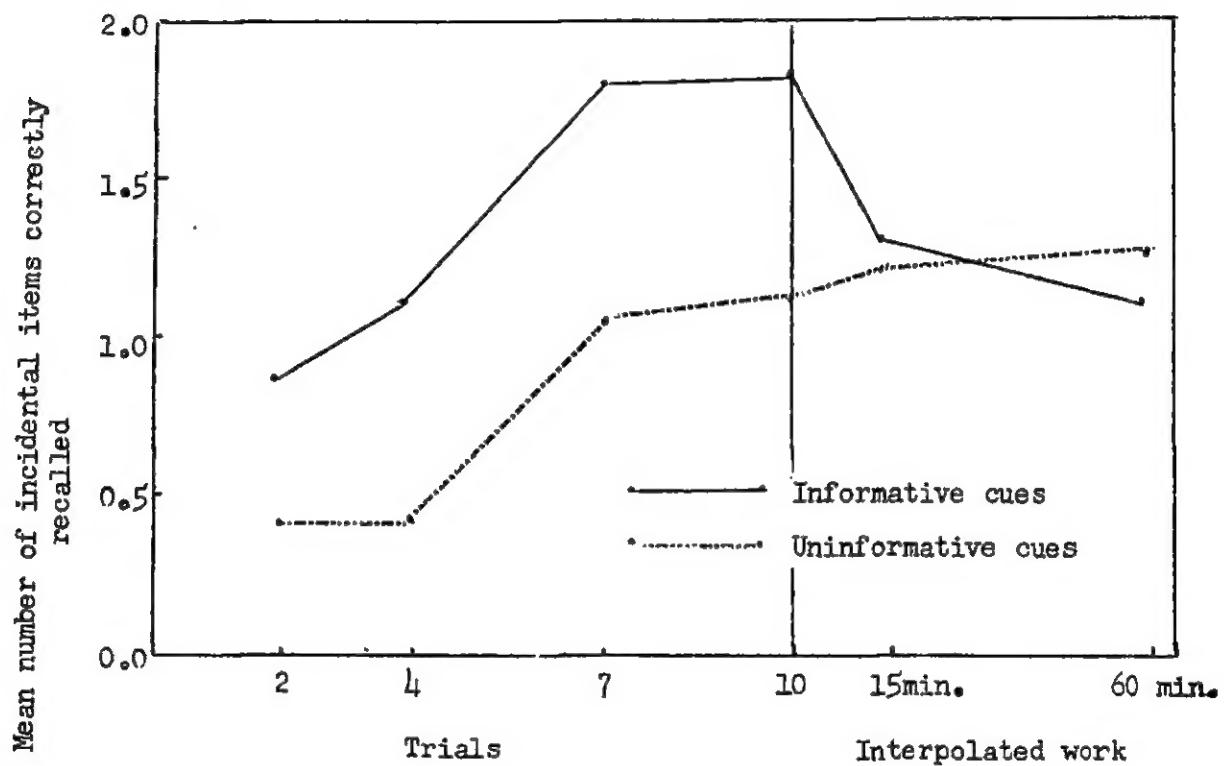


Figure 1. Learning and retention of incidental items

incidental learning increases with the number of trials. Table 1 reveals both of these findings to be highly significant. In Figure 1 the number of incidental items recalled seems to decrease after practice for Ss under the IS condition, while there does not seem to be any change for Ss under the US condition. An analysis of variance was performed on the number of incidental items recalled at trial ten, after 15 and 60 minutes of interpolated work, under the two learning conditions. However, none of the values of F were significant.

TABLE 1

ANALYSIS OF VARIANCE OF THE INCIDENTALLY LEARNED ITEMS  
ACQUIRED UNDER TWO CONDITIONS OF LEARNING

Source of Variance	df	Mean Square	F	P
Learning conditions	1	5.01	7.26	< .01
Trials	3	3.05	4.42	< .01
Learning conditions x trials	3	.16	.23	ns
Within cells	64	.69		

Many of the Ss could recall none of the incidental items. The distribution of recall scores, thus, tends to be skewed towards zero. In order to represent more fully such data, the median values for the number of incidental items recalled under IS and US conditions are given in Table 2. It is clear that the medians demonstrate the same relationships

TABLE 2

MEDIAN NUMBER OF INCIDENTAL ITEMS RECALLED

Learning condition	Trials				Amount of interpolated activity	
	2	4	7	10	15 min.	60 min.
IS	1	1	2	2	1.5	1
US	0	0	1	1	1	1

between acquisition, conditions of learning, number of trials, and retention as the means plotted in Figure 1.

#### Discussion and Summary

Interference in selection learning was said to be a function of cue informativeness (Technical Report No. 2). Under restricted response conditions, where decrements due to interference are most likely to be manifested this assertion was shown to be valid (Technical Report No. 3). Furthermore, the source of interference was assumed to be directly related to the difference in the amount of incidental learning under IS and US conditions. There is, thus, more interference generated under IS conditions because there is a higher level of incidental learning. It is incidental learning which is the source of interference in selection learning. This hypothesis was in part tested and confirmed when it was demonstrated that throughout acquisition, Ss in the IS condition can recall more of the incidental items than Ss in the US condition. It has been shown by Postman and Adams (1956) that incidental learning can create significant retroactive interference for intentional learning.

It is interesting, moreover, to note that the amount of incidental learning increases under both experimental conditions with the number of trials. An examination of the incidental learning curves reveals that the greatest increase occurred in the middle acquisition trials. This is quite different from previous finding in studies of incidental learning (Bahrick, 1957; Jantz and Underwood, 1958; Saltzman and Atkinson, 1954). In these studies most incidental learning occurred during the very early trials. Under selection learning conditions the person has

a set to learn while in the usual incidental learning experiment such a set is studiously avoided. Since the individual in selection learning cannot predict when an intentional or an incidental item will appear, this set to learn may be dominant when an incidental item is presented. Or, by stimulus generalization, the set to learn may be elicited by an incidental item. Either of these two events is much more likely to occur in a selection learning situation than in the ordinary incidental learning experiment. In the former the set to learn is either dominant when the incidental item is presented or is very high in the response hierarchy; in the latter situation, it is either inhibited or very low in the person's repertoire. Therefore, under selection learning, where the learning set is salient throughout practice, the curves of incidental learning may appear more similar to that of the common intentional learning curve than has been the case in past incidental learning experiments.

The data on retention of the incidental items are important in validating the explanation that has been set forward for the observed differences in retention of the intentional items. The consequences of selection learning for memory have been explained in terms of the dissipation of the relatively high level of interference in the IS condition. If incidental items act as a source of interference, then it follows that the difference in incidental learning present during practice should disappear during the interpolated interval. And as a corollary to this, a greater decrease in their retention should occur under the IS condition than under the US condition where they are already at a low level. Figure 1 shows that the number of incidental items retained drops consistently during the interpolated interval under IS conditions, while no

change in the initially small number retained under US conditions occurs. However, the decrement when compared to the minimal changes in US condition is not significant. Nevertheless, it can be said that the differences in incidental learning present during acquisition disappear during the interpolated interval. This fits in well with our previous findings that indicate dissipation of interference to be a very important determinant of the differences in retention initially observed in the exploratory experiments.

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